

CLAIM OR CLAIMS

WHAT IS CLAIMED IS:

1. A variable sample rate recursive digital filter comprising:

5 an adaptive digital filter having as an input an initial coefficient that
defines how a digital signal is processed at an initial sample rate by the
adaptive digital filter; and
 means for determining as a function of the initial coefficient and a ratio
between the initial sample rate and a new sample rate a new coefficient for
10 the adaptive digital filter when the digital signal is processed at the new
sample rate so that the frequency response of the adaptive digital filter is
constant at both sample rates.

2. The variable sample rate recursive digital filter as recited in claim 1
15 wherein the determining means comprises:

 means for calculating a coefficient factor as a function of the initial
coefficient and the ratio; and

 means for modifying the initial coefficient with the coefficient factor to
produce the new coefficient.

20 3. The variable sample rate recursive digital filter as recited in claim 2
wherein the calculating means performs the equation:

$$zFactor(z,R) := (1/z)\{(z(1+R) + (1-R))/(z(1-R) + (1+R))\}$$

where $zFactor(z,R)$ is the coefficient factor, z is the initial coefficient and R is
25 the ratio.

4. The variable sample rate recursive digital filter as recited in claims 2 or 3 wherein the modifying means comprises means for multiplying the initial coefficient by the coefficient factor to produce the new coefficient.

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5. A method of variable sample rate recursive digital filtering a digital signal comprising the steps of:

determining an initial sample rate and a corresponding initial coefficient for an adaptive digital filter that processes the digital signal;

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determining a new coefficient as a function of the initial coefficient and a ratio between the initial sample rate and a new sample rate for processing the digital signal; and

applying the new coefficient to the adaptive digital filter such that the adaptive digital filter has a constant frequency response at the two sample rates.

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6. The method as recited in claim 5 wherein the new coefficient determining step comprises the steps of:

calculating a coefficient factor as a function of the initial coefficient and the ratio; and

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modifying the initial coefficient with the coefficient factor to produce the new coefficient.

7. The method as recited in claim 6 wherein the calculating step comprises the steps of:

solving the equation:

$$zFactor(z,R) := (1/z)\{(z(1+R) + (1-R))/(z(1-R) + (1+R))\}$$

5 where $zFactor(z,R)$ is the coefficient factor, z is the initial coefficient and R is the ratio.

8. The method as recited in claims 6 or 7 wherein the modifying step comprises the step of multiplying the initial coefficient by the coefficient factor
10 to produce the new coefficient.